Comparison of Pre-Operative Difficulty estimation and Postoperative Morbidity in Third Molar Extraction

Difficulty Estimation of Third Molar Extraction

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Abstract

Aim: The purpose of this study is to evaluate the preexisting factors that affect the surgical difficulty of third molar extractions and its relationship between postoperative morbidity. Materials and Methods: Fifty patients were enrolled in this study. The Pederson Difficulty Index (PDI) (angulation, ramus distance, depth) was used to evaluate the difficulty of third molar extractions as well as operation time (OT) and general pain thresholds (GPT) of the patients. Postoperative edema (pre-operative, postoperative 1st day and 7th day) and maximum interincisal opening (MIO) of the patients (pre-operative, postoperative 1st day and 7th day) were measured. Also; VAS (Visual Analogue Scale) was filled (each day for one week after extraction) by patients. Results: According to the PDI, eight extractions were slightly difficult while 28 were moderately and 14 were very difficult. Fourteen teeth were mesioangular, six were distoangular, 14 were vertical and 16 teeth were horizontal. The shortest OT was 4 minutes while the longest was 55 minutes and the mean time was 11,32 min. On first postoperative day, trismus significantly increased with difficulty (P<0,001). However, there was no relationship between postoperative edema and pain with PDI. OT and 1st postoperative- day edema significantly increased as ramus distance decreased (P<0, 05). OT, 1st and 7th day edema significantly increased with tooth depth (P<0, 05). Discussion: Postoperative morbidity is strongly related with operation time, extraction technique and ramus distance rather than the Pederson difficulty index and angulation. In addition, general pain perception of the individual is a determining factor for post-operative MIO. As a conclusion, extraction technique and operation time might be considered as determining factors as well as pre-operative demographic findings for postoperative morbidity estimation.

Keywords

Tooth Extraction; Third Molar; Morbidity

Introduction

Third molar extractions have been performing routinely in daily practice of dentistry within concordance of the several postoperative complications. Complications are thought to occur due to the inflammatory process after the surgical extraction, like edema, pain, and trismus. The postoperative complications are related to the patient, angulation, and depth of tooth, type of operation and experience of the surgeon, and also affect the quality of patient's life and cause morbidity [1-2].

It is necessary to evaluate the difficulty of impacted third molar preoperatively to reduce the postoperative morbidity. Pederson has developed a difficulty index (PDI) based on clinical and radiological aspects that allows preoperative evaluation of the surgical difficulty of impacted third molars (Figure 1) [3].

Several studies have been published on the relation between preoperative factors and postoperative morbidity [1,4-7]. Reducing the postoperative morbidity after impacted third molar extraction will lead to removal of impacted third molar extraction being as a feared procedure.

The aim of the present study was to evaluate the preexisting factors that affect the surgical difficulty of third molar extractions and its relationship between postoperative morbidity.

Materials and Methods

This study was performed under the ethical approval of the Local Ethical Committee of Erciyes University. Fifty patients who admitted to Erciyes University, Faculty of Dentistry, Department of Oral and Maxillo-Facial Surgery (Kayseri, Turkey) for prophylactic extraction of impacted lower third molars were included in the study. All patients were free of systemic diseases, temporomandibular pain/dysfunction, smoking, drug habit and/or any other painful or neurologic disorder. Informed consent was obtained from the patients. Angulation, depth, ramus distance, root/crown ratio, preoperative maximum inter-incisal opening (MIO) and edema were measured preoperatively according to Schultze-Mosgau, et al. [7] (the distance from the corner of the mouth to the ear lobe and the outer canthus of the eye

to the angle of the mandible measured by a thread which was then transferred to a ruler). Facial swelling was calculated as horizontal measure plus vertical measurement divided by 2 and the percentage of edema as preoperative measurement minus postoperative measurement divided by preoperative measurement times 100. General pain threshold (GPT) values of the patients were measured with a mechanical algometer (Wagner Instruments Greenwich, CT). The device has a 1-cm2 rubber application head and measurements were calculated as kg/cm2. The algometer was applied onto the hypothenar region of the left hand 3 times and the mean values were assumed to be the GPT of the individuals.

The patients also filled Corah Dental Anxiety Scale 1 (CDAS). PDI was also calculated.

Surgical Procedure

All patients underwent lower third molar extraction under local anesthesia with 2 ml articaine HCL (ultracaine DS Sanofi Aventis) and the same experienced surgeon (O.A.E) performed all operations. Operation time (OT) (from the start of extraction procedure to the final suture), flap design, operation technique, and healing pattern were recorded. After the operation, all patients were prescribed the same medications (500 mg amoxicillin, 500 mg naproxen sodium, and chlorhexidine mouthwash).

Evaluation of the surgical difficulty

Surgical difficulty during the procedure was evaluated based on the surgical time and classification of the intraoperative difficulty on 4-level techniques; A: extraction with forceps only; B: extraction with osteotomy; C: extraction with osteotomy and coronal section; D, extraction with osteotomy and coronal and root sectioning.

### Evaluation of postoperative pain and edema

Postoperative edema and trismus were measured after 1st and 7th day. A visual analog scale (VAS) of 0 to 100 mm, which was designed as 0 being no pain and 100 being the worst pain ever experienced, was given to patients to quantify daily subjective postoperative pain for one week.

Classification	Value
Spatial relationship	
Mesioangular	1
Horizontal/transverse	2
Vertical	3
Distoangular	4
Depth	
Level A: high occlusal level	1
Level B: medium occlusal level	2
Level C: deep occlusal level	3
Ramus relationship/space available	
Class 1: sufficient space	1
Class 2: reduced space	2
Class 3: no space	3
Difficulty index	
Very difficult	7–10
Moderately difficult	5–6*
Slightly difficult	3–4

Figure 1. Pedersen Difficulty Index
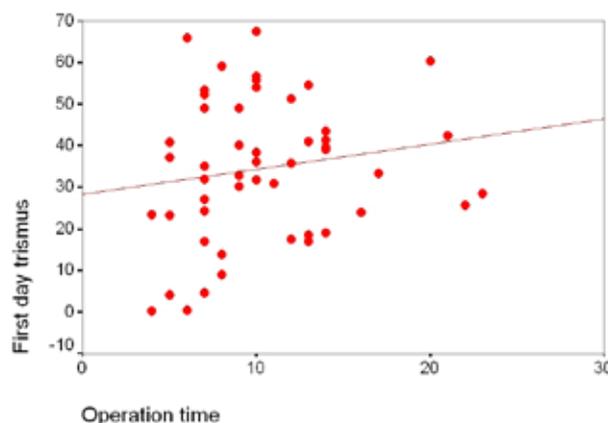
Figure 2. Relation between OT and st-day Trismus (p<0,001)
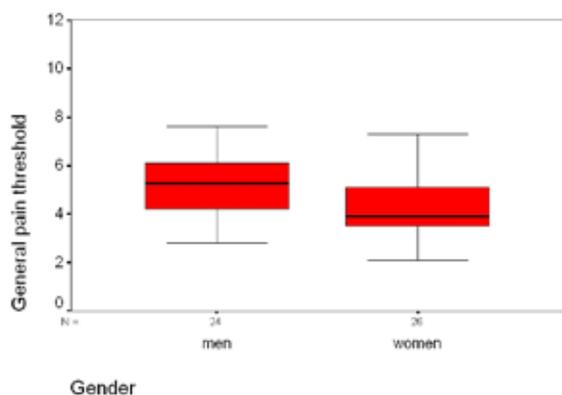
Figure 3. Relation between gender and GPT (p<0,017)

Figure 4. Positive correlation between age and OT (r=0,382, P=0.006)

Statistical Analysis

The Kruskal-Wallis test, the Mann-Whitney U test, and correlations were used to assess data (SPSS 15.0, SPSS Inc., Chicago, USA)
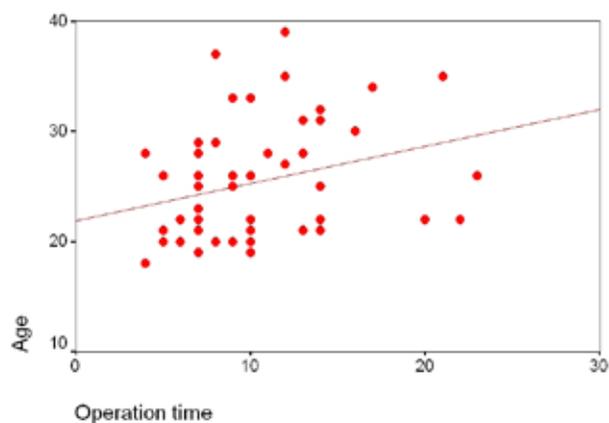
Results

Fifty patients (26 female, 24 male) were enrolled in the present study. The patients' ages ranged between 18-39 years and the mean age was 25,4 years.

According to PDI, eight extractions were slightly difficult while 28 were moderately and 14 were very difficult. Fourteen teeth were mesioangular, six were distoangular, 14 were vertical and 16 teeth were horizontal. Nine teeth were Class 1, 38 were Class 2 and 3 teeth were Class 3 due to ramus distance classification. Twenty-three teeth were Level A, 24 were Level B and three teeth were Level C due to depth classification. In 16 teeth, the root/crown ratio was in favor of the root, while in 34 teeth, the root/crown ratio was in favor of the crown.

Six teeth were extracted with technique A, 13 teeth were extracted with technique B, and nine teeth were extracted with technique C, 22 teeth were extracted with technique D.

The shortest OT was 4 minutes while the longest was 55 min-

utes and the mean time was 11,32 minutes; trismus on the 7th day and edema on the 1st day were significantly higher as operation technique was getting harder (P<0,05). On the first day, trismus significantly increased with difficulty (P<0,001) (Figure 2). However, there was no relationship between postoperative edema and pain with PDI.

In female patients, 1st and 7th day trismus and 1st day edema were higher than males but this finding was not statistically significant. However, female patients' GPT values were significantly lower than males (P<0,017) (Figure 3). There was no relationship between the root/crown ratio and postoperative morbidity (P>0,05).

OT of the vertical teeth extractions is lower than OT of the teeth extractions with other angulations (P<0,031). OT and 1st day edema significantly increased as ramus distance decreased (P<0, 05). OT, 1st and 7th day edema significantly increased with tooth depth (P<0, 05). Third-day VAS scores of the patients with moderately and severely decreased ramus distance (class 2 and 3) were significantly higher than patients with sufficient ramus distance (class 1) (P<0.05). OT is positively correlated with age (r=0,382, P=0.006) (Figure 4), 1st day edema (r=0,336, P<0,017) and 7th day edema (r=0,320,
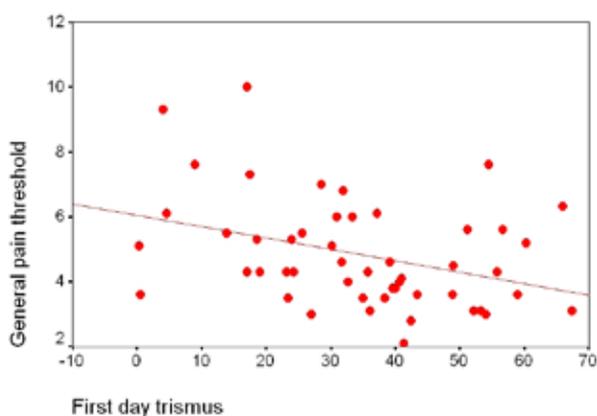
Figure 5. Negative correlation between GPT and 1st-day trismus (r=-0,350, P<0,013)
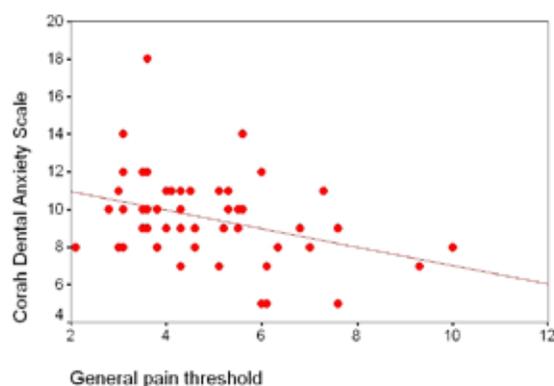
Figure 6. Negative correlation between GPT and dental anxiety scale scores (r=-0,334, P=0.018)

P<0,024). First-day trismus was also negatively correlated with GPT (r=-0,350, P<0,013) (Figure 5). GPT values of the patients were negatively correlated with CDAS (r=-0,334, P=0.018) (Figure 6) and positively correlated with 7th day VAS scores (r=-290, P=0,043). First-day trismus was positively correlated with 3rd day VAS scores (r=0,334, P=0,019) and 7th day VAS scores (r=0,298, P=0,037). CDAS scores were also positively correlated with 1st day trismus (r=0,298, P=0,034) and age (r=0,390, P=0,005). However, CDAS and VAS scores of males and females were similar (P>0,05).

Discussion

Impacted third molar extractions have always been a fearful procedure among the patients due to postoperative morbidity, and affects patients' life quality negatively. Most of the papers were aimed to reduce postoperative morbidities of impacted third molar extractions [8-12]. According to results of the present study, postoperative morbidity is strongly related to operation time, extraction technique, and ramus distance rather than PDI and angulation in lower third molar surgery. However, MIO decreased as PDI index increased. In addition, general pain perception of the individual is a determining factor for postoperative MIO rather than pain. This might be that patients with lower GPT values tend to limit their functions because of early pain perception. Extraction technique and operation time might be considered as determining factors as well as pre-operative demographic findings for post-operative morbidity estimation. According to the results of the present study, angulation is not a determining factor for postoperative morbidity. However, the duration of the operation time was significantly lower for vertically positioned teeth. Nevertheless, the position of tooth might indirectly affect the postoperative course as theatre time is related to morbidity. The extraction technique is another factor that affects post-operative morbidity. When the extraction technique is getting harder, OT is getting longer and this condition leads to more edema and trismus.

In the present study, PDI was used for the assessment of surgical difficulty due to radiological findings but Yuasa et al. [3] concluded that PDI is not so sensitive and specific in determining the degree of difficulty of the third molars that was in accordance with the results of the present study.

Patients' age is a determining factor on the difficulty level of the surgical operation. Older age means dense bone causing increased OT. Similarly, Renton et al. [13] found that gender is not a determining factor for postoperative morbidity, which was in accordance with the results of the present study.

VAS score is related to the depth of tooth due to the present study. A deeper tooth requires harder operation technique and because of the position and angulation of the tooth OT is getting longer and post-operative pain is getting higher.

As a conclusion, this study announces that determination of surgical difficulty with pre-operative findings such as tooth depth and ramus distance are important factors rather than angulation for assessing post-operative morbidity. However, individual pre-operative factors such as general pain perception, age, and anxiety as well as intra-operative factors as operation time and operation technique should be considered in estimating postoperative morbidity for lower third molar surgery. In addition, surgeon should be familiar with the possible results and try to minimize the complications, while patients should be informed about results or possible complications of the third molar surgery.

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